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ABSTRACT

Management of insulin dependent diabetes mellitus (IDDM) is a complex task that requires the adolescent with IDDM recognize the interaction between diet, exercise, stress, emotions, and insulin dosage. With regularity, however, adolescents with IDDM are shown to be in less good metabolic control than younger children or young adults. The study explored the combined effects of cognitive maturity and stressful life events on metabolic control among 120 adolescents (mean age 15.2 years) with insulin dependent diabetes mellitus (IDDM). Subjects were individually administered the Hunt Paragraph Completion Method measure of cognitive maturity and the Johnson and McCutcheon inventory of stressful life events. Metabolic control was assessed by total glycosylated hemoglobin. Analysis of variance revealed significant effects on metabolic control related to sex ($p < .01$), cognitive maturity ($p < .001$), and negative life events ($p < .05$). Adolescents with lower cognitive maturity were more likely to have elevated glycosylated hemoglobin levels. Likewise those with more and more intensely rated negative life events had higher glycosylated hemoglobin levels. Finally, females were in less good metabolic control than their male peers. Age, positive life events and early or late onset of IDDM were not significant. (CL)

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COGNITIVE MATURITY, STRESSFUL EVENTS AND METABOLIC CONTROL IN ADOLESCENTS WITH DIABETES

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ABSTRACT

Management of insulin dependent diabetes mellitus (IDDM) is a complex task that requires the adolescent with IDDM recognize the interaction between diet, exercise, stress, emotions, and insulin dosage. With regularity, however, adolescents with IDDM are shown to be in less good metabolic control than younger children or young adults. Our previous research has demonstrated a relationship of level of cognitive maturity to adolescents' willingness to engage in selected compliance behaviors related to positive metabolic control and to control levels themselves. Those adolescents at lower levels of cognitive maturity displayed more difficulty in maintaining good metabolic control. Other studies have shown that stress and stressful life events also affect metabolic control. This study explored the combined effects of cognitive maturity and stressful life events on metabolic control among adolescents with IDDM.

Subjects were 120 adolescents (mean age = 15.2 years) with IDDM. They were individually administered the Hunt Paragraph Completion Method (PCM) measure of cognitive maturity and the Johnson and McCutcheon inventory of stressful life events. Metabolic control was assessed by total glycosylated hemoglobin. Analyses of variance revealed significant effects on metabolic control related to sex ($p < .01$), cognitive maturity ($p < .001$) and negative life events ($p < .05$). Adolescents with lower cognitive maturity were more likely to have elevated glycosylated hemoglobin levels. Likewise, those with more and more intensely rated negative life events had higher glycosylated hemoglobin levels. Finaly, females were in less good metabolic control than their male peers. Age, positive life events and early or late onset of IDDM were not significant. Data were subsequently entered into a LISREL analysis of structural equations. The resulting recursive model accounted for 33 percent of variance in metabolic control.

METHODS AND SUBJECTS

Subjects for the study were 120 adolescents with IDDM. They were recruited from the adolescent diabetes clinic at the James Whitcomb Riley Hospital for Children of th Indiana University Medical Center, Indianapolis as well as through local diabetes support groups and advertisements placed in a college newspaper.

Each subject was administered the Paragraph Completion Method (Hunt et al., 1971) measure of cognitive maturity. The PCM is a semi-projective instrument requiring written responses to six open-ended topical stems to assesss the individual's concepts and beliefs regarding authority, uncertainty, rules, and conflict. Responses are scored by trained raters using a four-point scale (Rxx = 0.83).

Subjects were also administered the Johnson and McCutcheon (1980) measure of significant life events for adolescents. The scale requires the respondent to indicate which of a series of stressful events have occured in their lifes within the past six months and to what extent the events were positive or negative.

Adequacy of metabolic control was measured using total glycosylated hemoglobin (HbA_1) levels. HbA_1 values offer an estimate of quality of overall metabolic control for the past two to three months.

RESULTS

Analyses reveal that those adolescents with IDDM in the poorest metabolic control [see Table 1] were also those at the lowest levels of cognitive maturity ($p < .001$), had more and more intense negative life events ($p < .01$) and were more likely female ($p < .001$). Conversely, those at higher levels of cognitive maturity were more likely to have lower HbA_1 levels [see Table 2]. While negative life events were related to metabolic control, i. e., those with more and more intense negative life events had higher HbA_1 levels (poorer control), positive life events appeared unrelated to adequacy of metabolic control.

When the variables sex, current age, age of disease onset, cognitive maturity and negative life events were entered as elements in structural equations with HbA_1 levels as the dependent variable, the resulting linear model resulted in a squared multiple correlation of 0.352 ($p < .001$). The path diagram is seen in Figure 1. The resulting path diagram indicates that cognitive maturity is the primary psychosocial contributor to glycosylated hemoglobin levels, including an indirect contribution through perceived negative life events. Current age and age at onset of the disease are only indirectly related to metabolic control through cognitive maturity. Interestingly, while the linear contribution of age at onset to cognitive maturity was not statistically significant ($.05 < p < .10$), it is in the expected direction given the research of Ryan et al.

TABLE 1

MEAN VALUES OF SELECTED VARIABLES FOR

ADOLESCENTS IN GOOD, MODERATE AND POOR METABOLIC CONTROL

	HbA_1 CONTROL			
	GOOD	MODERATE	POOR	
	(<9.0)	(9.0-11.0)	(>11.0)	
VARIABLE				
COGNITIVE MATURITY (PCM)	1.70	1.45	1.16	P < .001
POSITIVE LIFE EVENTS	10.30	11.78	12.97	NS
NEGATIVE LIFE EVENTS	7.70	13.52	15.82	P < .01
SEX (1 = M, 2 = F)	1.43	1.36	1.75	P < .001
CURRENT AGE	16.07	15.48	14.73	NS
AGE AT DIAGNOSIS	10.17	9.14	9.68	NS

TABLE 2

HbA_1 LEVELS OF MALES AND FEMALES AT

THREE LEVELS OF COGNITIVE MATURITY

	COGNITIVE MATURITY			
	LOW	MODERATE	HIGH	ALL
MALES	11.42	9.64	9.23	9.84
FEMALES	11.94	10.91	9.90	11.00
ALL	11.74	10.30	9.49	10.43

* Higher values imply poorer metabolic control.

TABLE 3

INTER-CORRELATION MATRIX

	AGE	ONSET	SEX	COG MAT	NEG EV
ONSET	-.061				
SEX	.001	-.107			
COG MAT	.405	.107	-.117		
NEG EV	.002	-.402	.052	-.183	
HbA1	-.182	-.027	.312	-.470	.272

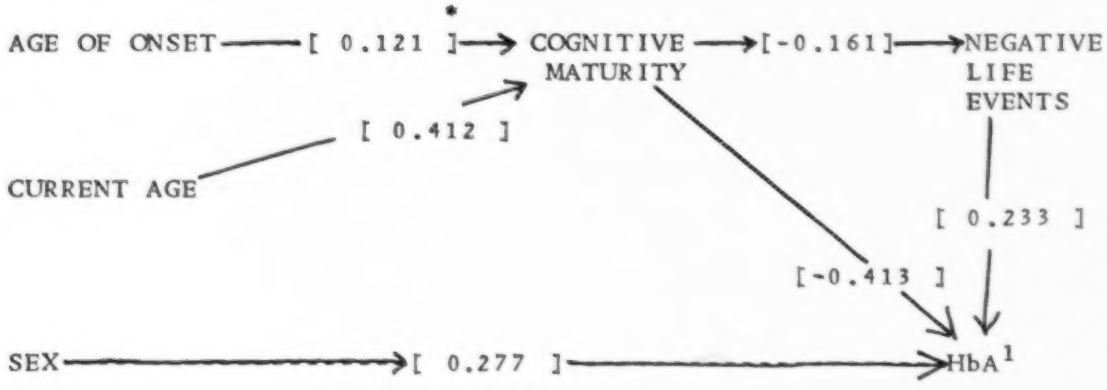
CONCLUSIONS

Some researchers have suggested that a developmental psychological view is particularly relevant for understanding management of diabetes mellitus among children and adolescents. Our data support this view. Adolescents with lower cognitive maturity (reflected in lower PCM scores) are more likely to have elevated glucosylated hemoglobin levels reflecting poorer metabolic control. Those at advanced levels of cognitive maturity are more likely in good metabolic control. While age is strongly correlated with cognitive maturity, it is not a direct contributor to metabolic control.

Life events appear to play a mixed role in the adolescents' abilities to deal with their IDDM. Negative life events appear to have more of an impact than do positive life events. Further, those at lower levels of cognitive maturity are more apt to report higher negative life events scores.

FIGURE 1

PATH DIAGRAM OF RECURSIVE MODEL FOR EFFECTS OF COGNITIVE MATURITY AND NEGATIVE LIFE EVENTS ON METABOLIC CONTROL



* NS, .05 < P < .10